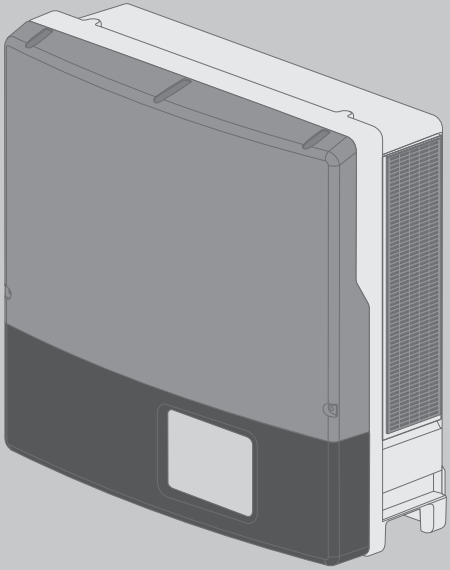
Operating Manual

SUNNY TRIPOWER 15000TL / 17000TL



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AMERICAN ENGLISH

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1 Information on this Document

1.1 Validity

This document is valid for the following device types:

- STP 15000TL-10 (Sunny Tripower 15000TL)
- STP 17000TL-10 (Sunny Tripower 17000TL)

1.2 Target Group

This document is intended for qualified persons and end users. Only qualified persons are allowed to perform the activities marked in this document with a warning symbol and the caption "Qualified person". Tasks that do not require any particular qualification are not marked and can also be performed by end users. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of the applicable standards and directives
- Knowledge of and compliance with this document and all safety information

1.3 Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document title and content	Document type
Troubleshooting, Cleaning, Replacement of Varistors and Decommissioning	Service Manual
"Overview of the Rotary Switch Settings" Overview of the rotary switch settings for configuring the country data set and display language	Technical Information
"Efficiency and Derating" Efficiency and Derating Behavior of the Sunny Boy, Sunny Tripower and Sunny Mini Central Inverters	Technical Information
"Criteria for Selecting a Residual-Current Device"	Technical Information
"Circuit Breaker" Dimensioning and Selection of a Suitable AC Circuit Breaker for Inverters under PV-Specific Influences	Technical Information
"Insulation Resistance (Riso) of Non-Galvanically Isolated PV Systems"	Technical Information

Document title and content	Document type
"Integrated Plant Control and Q on Demand 24/7" Detailed explanation of functions and description for setting the functions	Technical Information
"Webconnect Systems in Sunny Portal" Registration in Sunny Portal	User Manual
"Firmware Update with SD Card"	Technical Description
"Parameter list" Overview of All Inverter Operating Parameters and Their Configuration Options	Technical Information

1.4 Symbols

Symbol	Explanation
⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
⚠ QUALIFIED PERSON	Sections describing activities to be performed by qualified persons only
i	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that might occur

1.5 Nomenclature

Complete designation	Designation in this document
Sunny Tripower	Inverter, product
Electronic Solar Switch	ESS
SMA BLUETOOTH Wireless Technology	BLUETOOTH

2 Safety

2.1 Intended Use

The Sunny Tripower is a transformerless PV inverter with two MPP trackers which converts the direct current of the PV array to grid-compliant three-phase current and feeds it into the utility grid.

The product is suitable for indoor and outdoor use.

The product must only be operated with PV arrays of protection class II in accordance with IEC 61730, application class A. The PV modules must be compatible with this product.

PV modules with a high capacity to ground must only be used if their coupling capacity does not exceed 2.55 µF (for information on how to calculate the coupling capacity, see the Technical Information "Leading Leakage Currents" at www.SMA-Solar.com).

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and directives. Any other application may cause personal injury or property damage.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and usually void the operation permit. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

The type label must remain permanently attached to the product.

2.2 Safety Information

This section contains safety information that must be observed at all times when working on or with the product.

To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

⚠ DANGER

Danger to life due to high voltages of the PV array

When exposed to sunlight, the PV array generates dangerous DC voltage which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Have the inverter mounted, installed and commissioned only by qualified persons with the appropriate skills.
- If an error occurs, have it rectified by qualified persons only.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 10 "Disconnecting the Inverter from Voltage Sources", page 48).

⚠ DANGER

Danger to life due to electric shock

Touching an ungrounded PV module or array frame can cause a fatal electric shock.

- Connect and ground the PV modules, array frame and electrically conductive surfaces so that there is continuous conduction. Observe the applicable local regulations.

⚠ CAUTION

Risk of burns due to hot enclosure parts

Some parts of the enclosure can get hot during operation.

- Do not touch any parts other than the lower enclosure lid of the inverter during operation.

NOTICE

Damage to the seal of the enclosure lids in subfreezing conditions

If you open the upper and lower enclosure lids in subfreezing conditions, the seals on the enclosure lids can be damaged. This can lead to moisture entering the inverter.

- Do not open the inverter at ambient temperatures lower than -5°C.
- If a layer of ice has formed on the seal of the lid in subfreezing conditions, remove it prior to opening the enclosure lids of the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

NOTICE

Damage to the display or the type label due to the use of cleaning agents

- If the inverter is dirty, clean the enclosure, the enclosure lid, the type label, the display and the LEDs with a damp cloth only.

3 Scope of Delivery

Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

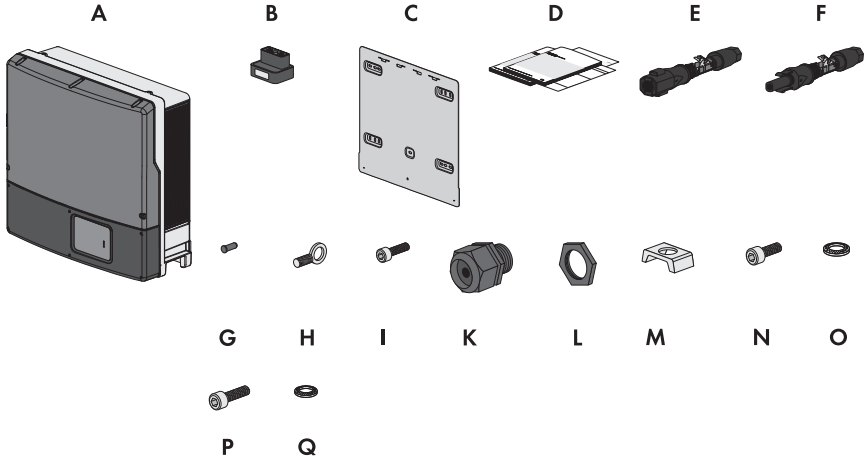


Figure 1: Components included in the scope of delivery

Position	Quantity	Designation
A	1	Inverter
B	1	Electronic Solar Switch (ESS)
C	1	Rear panel
D	1	Operating manual, document set with declarations and certificates, supplementary sheet with default settings, installation manual of the DC connectors
E	12	Negative DC connector
F	12	Positive DC connector
G	12	Sealing plug
H	1	Eye bolt M8
I	2	Cylindrical screw M5 x 10
K	1	AC cable gland
L	1	Counter nut
M	1	Clamping bracket
N	1	Cylindrical screw M6 x 16
O	1	Conical spring washer M6

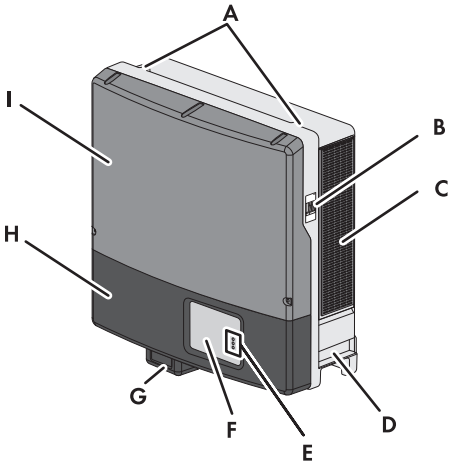
Position	Quantity	Designation
P	2	Cylindrical screw M5 x 20*
Q	2	Conical spring washer M5*

* Spare part for the enclosure lid

4 Product Description

4.1 Sunny Tripower

The Sunny Tripower is a transformerless PV inverter with two MPP trackers which converts the direct current of the PV array to grid-compliant three-phase current and feeds it into the utility grid.



Position	Explanation
A	Thread for screwing in the two eye bolts for transporting the inverter with a crane
B	Type label The type label uniquely identifies the inverter. You will require the information on the type label to use the product safely and when seeking customer support from Service. You will find the following information on the type label: • Device type (Model) • Serial number (Serial No.) • Date of manufacture • Device-specific characteristics
C	Ventilation grid
D	Recessed grip
E	LEDs The LEDs indicate the operating state of the inverter (see Section 9.1 "LED Signals", page 44).
F	Display The display shows the current operating data and events or errors (see Section 9.2 "Display Overview", page 45).

Position	Explanation
G	Electronic Solar Switch (ESS) The ESS and the DC connectors together form a DC load-break switch. When plugged in, the ESS forms a conductive path between the PV array and the inverter. Removing the ESS interrupts the DC electric circuit and removing all DC connectors disconnects the PV array completely from the inverter.
H	Lower enclosure lid
I	Upper enclosure lid

Symbols on the inverter, the ESS and the type label

Symbol	Explanation
	Inverter Together with the green LED, this symbol indicates the operating state of the inverter.
	Observe the documentation Together with the red LED, this symbol indicates an error (for troubleshooting, see the service manual at www.SMA-Solar.com).
	BLUETOOTH Together with the blue LED, the symbol indicates active communication via BLUETOOTH.
	Danger This symbol indicates that the inverter must be additionally grounded if additional grounding or equipotential bonding is required at the installation site (see Section 6.3.3 "Connecting Additional Grounding", page 28).
	QR Code Links to additional information on the inverter can be found at www.SMA-Solar.com.

Symbol	Explanation
	Operating principle of the ESS: • ❶ If the ESS is plugged in, the DC electric circuit is closed. • If an acoustic signals sounds and the display shows an error message that prohibits removing the ESS, wait until dark. The ESS can only be removed once it is dark. • ❿ If no acoustic signal sounds and the display does not show an error message, the DC electric circuit may be interrupted. To interrupt the DC electric circuit, you must perform the following steps in the given order: – Remove the ESS. – ❷ Unlock and remove all DC connectors.
	Danger to life due to high voltages in the inverter; observe the waiting time of 20 minutes. High voltages that can cause lethal electric shocks are present in the live components of the inverter. Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 10, page 48).
	Danger to life due to electric shock The product operates at high voltages. All work on the product must be carried out by qualified persons only.
	Risk of burns due to hot surfaces The product can get hot during operation. Avoid contact during operation. Allow the product to cool down sufficiently before carrying out any work.
	Observe the documentation Observe all documentation supplied with the product.
DC	Direct current
	The product does not have a transformer.
AC 3N	Three-phase alternating current with neutral conductor
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the locally applicable disposal regulations for electronic waste.

Symbol	Explanation
CE	CE marking The product complies with the requirements of the applicable EU directives.
IP65	Degree of protection IP65 The product is protected against dust intrusion and water jets from any angle.
	The product is suitable for outdoor installation.
	Certified safety The product is VDE-tested and complies with the requirements of the German Equipment and Product Safety Act.
	RCM (Regulatory Compliance Mark) The product complies with the requirements of the applicable Australian standards.
	Korean mark of conformity The product complies with the requirements of the applicable Korean directives.

4.2 Interfaces and Functions

The inverter can be equipped or retrofitted with the following interfaces and functions:

BLUETOOTH

Via BLUETOOTH, the inverter can communicate with various BLUETOOTH devices (for information on supported SMA products, see www.SMA-Solar.com).

Speedwire/Webconnect

SMA Speedwire/Webconnect is a type of communication based on the Ethernet standard. This enables inverter-optimized 10/100 Mbit data transmission between Speedwire devices in PV systems and the software Sunny Explorer. The Webconnect function enables direct data transmission between the inverters of a small-scale system and the Internet portal Sunny Portal without any additional communication device and for a maximum of four inverters per Sunny Portal system. In large-scale PV power plants, data transmission to the Internet portal Sunny Portal is carried out via the SMA Cluster Controller. You can access your Sunny Portal system from any computer with an Internet connection.

SMA Speedwire/Webconnect enables, for PV systems operated in Italy, the connection to or disconnection of the inverter from the utility grid and definition of the frequency limits to be used with IEC61850-GOOSE messages.

SMA Speedwire/Webconnect can be retrofitted.

RS485 interface

The inverter can communicate via cables with special SMA communication products via the RS485 interface (information on supported SMA products at www.SMA-Solar.com). The RS485 interface can be retrofitted.

Grid Management Services

The inverter is equipped with service functions for grid management.

Depending on the requirements of the grid operator, you can activate and configure the functions (e.g. active power limitation) via operating parameters.

SMA Power Control Module

The SMA Power Control Module enables the inverter to implement grid management services and is equipped with an additional multifunction relay (for information on installation and configuration, see the installation manual of the SMA Power Control Module). The SMA Power Control Module can be retrofitted.

Multifunction Relay

You can configure the multifunction relay for various operating modes. The multifunction relay is used, for example, to switch fault indicators on or off (for information on installation and configuration, see the installation manual of the multifunction relay). The multifunction relay can be retrofitted.

SMA OptiTrac Global Peak

SMA OptiTrac Global Peak is an advancement of SMA OptiTrac and allows the operating point of the inverter to follow the optimal operating point of the PV array (MPP) precisely at all times. In addition, with the aid of SMA OptiTrac Global Peak, the inverter can detect the presence of several maximum power points in the available operating range, such as may occur particularly with partially shaded strings. SMA OptiTrac Global Peak is enabled by default.

String-failure detection

String-failure detection recognizes the failure of an individual string or substring. If an insulation error occurs, string-failure detection disconnects the defective string from the inverter. This avoids having to shut down the entire PV array. In order for the string-failure detection to be reliable, identically aligned PV modules must be connected to both inputs of the inverter. String-failure detection is deactivated by default and must be activated.

Surge Arrester Type II

The surge arresters monitor the PV modules and limit dangerous overvoltages. Surge arresters of type II can be retrofitted.

Electronic string fuse

The electronic string fuse protects the PV array against potential reverse currents. The electronic string fuse recognizes DC cables that were connected with reverse polarity or defective PV modules and short-circuits the PV array. In order for the electronic string fuse function to be reliable, the connection of the PV array must be made when there is sufficient irradiation. If the input voltage is less than 188 V, the protective function of the electronic string fuse is not active when the connection is made.

Q on Demand 24/7

The inverter can supply reactive power by means of Q on Demand 24/7 covering the entire unit circle around the clock.

Integrated Plant Control

The inverter can display the Q(V) characteristic curve specified by the grid operator by means of Integrated Plant Control without measuring on the grid-connection point. The inverter can automatically compensate equipment installed between the inverter and the grid-connection point.

5 Mounting

5.1 Requirements for Mounting

Requirements for the mounting location:

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fires.

- Do not mount the inverter in areas containing highly flammable materials or gases.
- Do not mount the inverter in a potentially explosive atmosphere.

☐ Do not mount the inverter on a pillar.

☐ The mounting location must be inaccessible to children.

☐ A solid support surface must be available for mounting, e.g. concrete or masonry. When mounted on drywall or similar materials, the inverter emits audible vibrations during operation which could be perceived as annoying.

☐ The mounting location must be suitable for the weight and dimensions of the inverter (see Section 11 "Technical Data", page 50).

☐ To ensure optimum operation, the ambient temperature should be between -25°C and 40°C.

☐ The mounting location should not be exposed to direct solar irradiation. Direct solar irradiation can cause the inverter to overheat. As a result, the inverter reduces its power output.

☐ Climatic conditions must be met (see Section 11 "Technical Data", page 50).

☐ The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.

Dimensions for mounting:

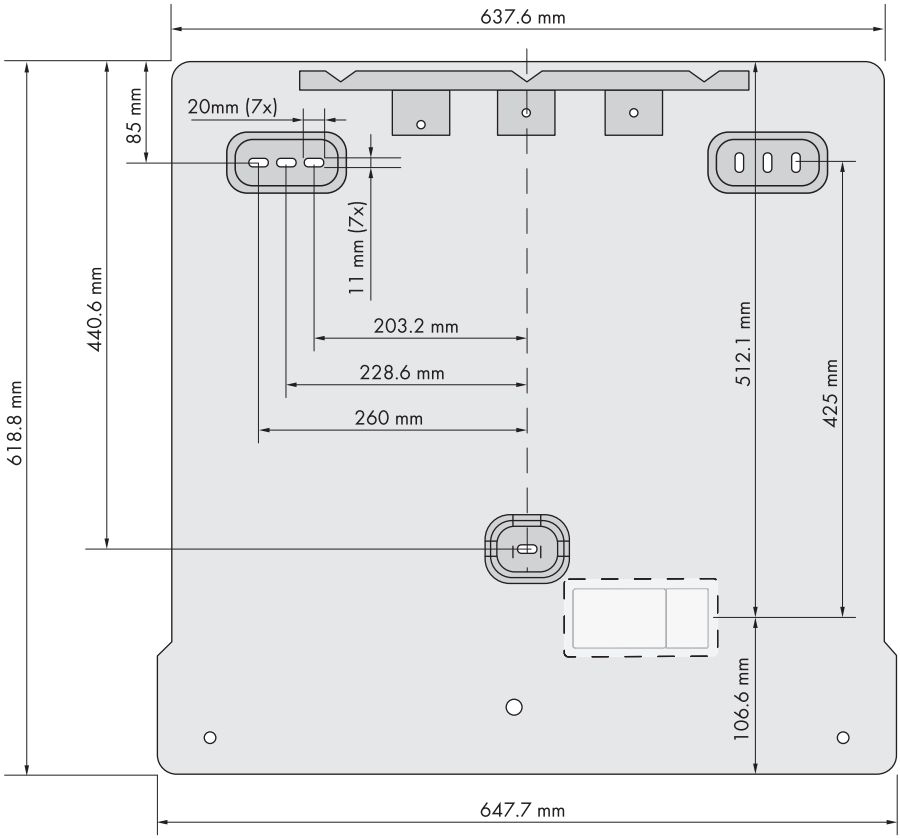


Figure 2: Position of the anchoring points

Recommended clearances:

If you maintain the recommended clearances, adequate heat dissipation will be ensured. Thus, you will prevent power reduction due to excessive temperature.

- ☐ Maintain the recommended clearances to walls as well as to other inverters or objects.
- ☐ If multiple inverters are mounted in areas with high ambient temperatures, increase the clearances between the inverters and ensure sufficient fresh-air supply.

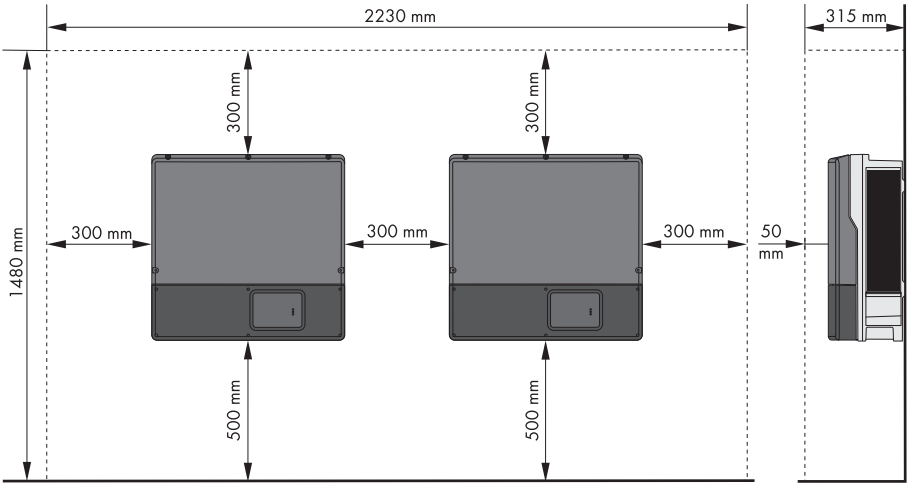


Figure 3: Recommended clearances

Permitted and prohibited mounting positions:

- ☐ The inverter must be mounted in one of the permitted positions. This will ensure that no moisture can penetrate the inverter.
- ☐ The inverter should be mounted in such way that display messages and LED signals can be read without difficulty.

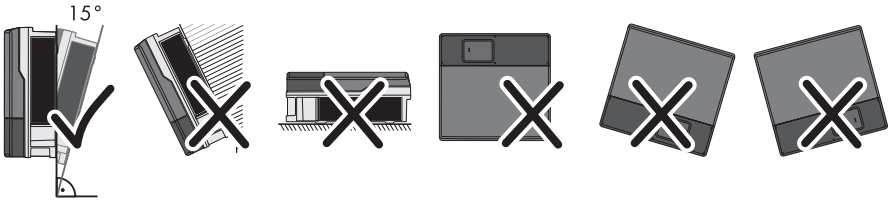


Figure 4: Permitted and prohibited mounting positions

5.2 Mounting the Inverter

⚠ QUALIFIED PERSON

Additionally required mounting material (not included in the scope of delivery):

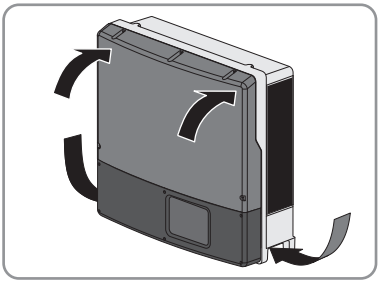
- ☐ Three screws suitable for the support surface (size: M10 at maximum)
- ☐ Three washers suitable for the screws (diameter: 30 mm at maximum)
- ☐ If necessary, three screw anchors suitable for the support surface and the screws
- ☐ For transporting the inverter with a crane: two eye bolts suitable for the weight of the inverter (size: M10)
- ☐ To secure the inverter against theft: one padlock suitable for outdoor use

⚠ CAUTION

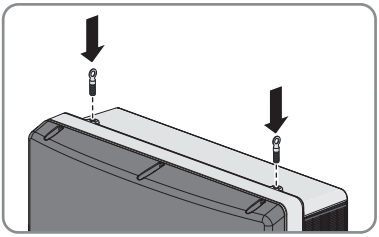
Risk of injury when lifting the inverter, or if it is dropped

The inverter weighs 59 kg. There is risk of injury if the inverter is lifted incorrectly or dropped while being transported or when attaching it to or removing it from the wall mounting bracket.

- Carry and lift the inverter in an upright position with several people without tilting it. With one hand grasp the recessed grip, and with the other hand support the top part of the enclosure. This will prevent the inverter tipping forward.



- If the inverter is to be transported and lifted with a crane, remove the filler plugs on the top of the inverter and screw the eye bolts into the threads.



⚠ CAUTION

Risk of burns due to hot enclosure parts

Some parts of the enclosure can get hot during operation.

- Mount the inverter in such a way that it cannot be touched inadvertently during operation.

Procedure:

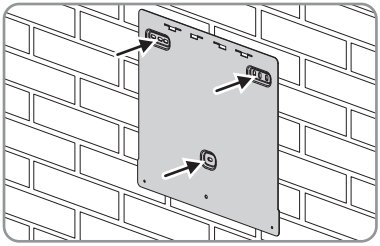
1. **⚠ CAUTION**

   Risk of injury due to damaged cables

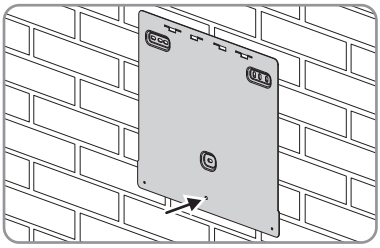
   There may be power lines or other supply lines (e.g. gas or water) routed in the wall.

   - Ensure that no lines are laid in the wall which could be damaged when drilling holes.

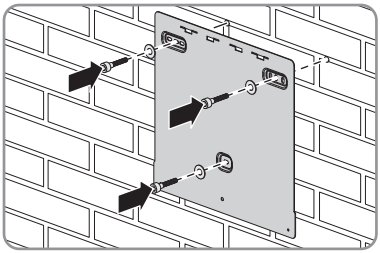
2. Align the rear panel horizontally on the wall and use it to mark the position of the drill holes for attaching the rear panel. Use at least one hole on the upper right and the upper left and the hole in the middle of the rear panel.



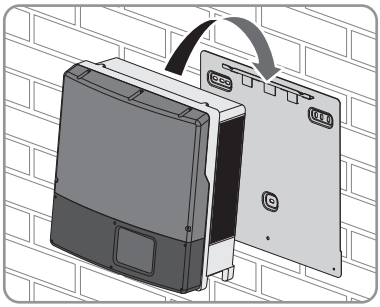
3. If the inverter is to be secured against theft, mark the drill hole for the attachment of the eye bolt.



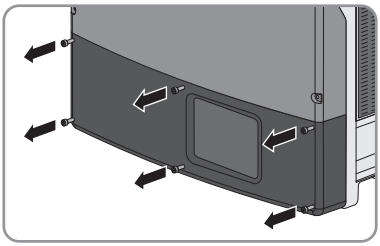
4. Set the rear panel aside and drill the marked holes.
5. Depending on the support surface, insert the screw anchors into the drill holes for attaching the rear panel.
6. Secure the rear panel using screws and washers.



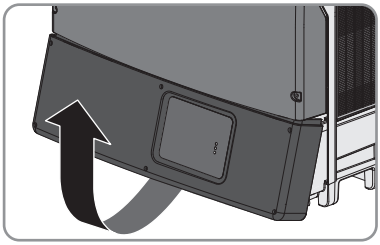
7. Hook the inverter into the rear panel. The enclosure has to be flush with the rear panel on the right-hand and on the left-hand side.



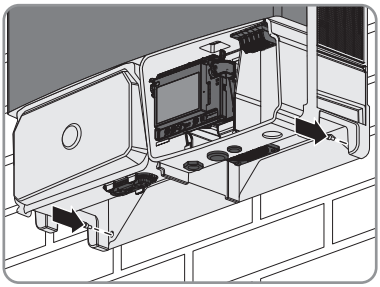
8. If the inverter has been transported with a crane, remove the eye bolts from the threads on the top of the inverter and reinsert the filler plugs.
9. Remove all six screws from the lower enclosure lid using an Allen key (AF 3).



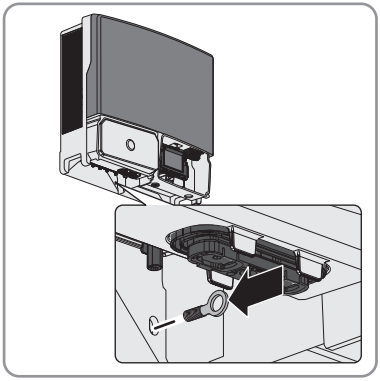
10. Flip the lower enclosure lid up and remove it.



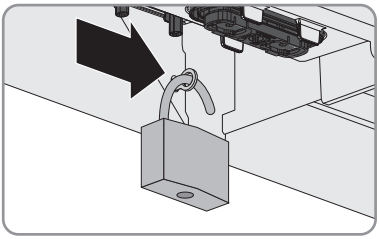
11. Fasten the inverter to the rear panel. Tighten the two cylindrical screws M5x10 in the threads on the left-hand and right-hand side of the rear panel (torque: 6 Nm ± 0.3 Nm) using an Allen key (AF 4).



12. Ensure that the inverter is securely in place.
13. If the inverter is to be protected against theft, attach the eye bolt and install the padlock:
    - Screw the M8 eye bolt into the wall through the rear panel. When tightened, the eye of the bolt must be vertical to the enclosure.



    - Lead the shackle of the padlock through the hole of the eye bolt.



    - Close the padlock.
    - Keep the key of the padlock in a safe place.

6 Electrical Connection

6.1 Safety during Electrical Connection

⚠ DANGER

Danger to life due to high voltages of the PV array

When exposed to sunlight, the PV array generates dangerous DC voltage which is present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the inverter under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends.
- Do not touch the DC conductors.
- Do not touch any live components of the inverter.
- Have the inverter mounted, installed and commissioned only by qualified persons with the appropriate skills.
- If an error occurs, have it rectified by qualified persons only.
- Prior to performing any work on the inverter, disconnect it from all voltage sources as described in this document (see Section 10 "Disconnecting the Inverter from Voltage Sources", page 48).

NOTICE

Damage to the seal of the enclosure lids in subfreezing conditions

If you open the upper and lower enclosure lids in subfreezing conditions, the seals on the enclosure lids can be damaged. This can lead to moisture entering the inverter.

- Do not open the inverter at ambient temperatures lower than -5°C.
- If a layer of ice has formed on the seal of the lid in subfreezing conditions, remove it prior to opening the enclosure lids of the inverter (e.g. by melting the ice with warm air). Observe the applicable safety regulations.

NOTICE

Damage to the inverter due to electrostatic discharge

Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.

- Ground yourself before touching any component.

6.2 Overview of the Connection Area

6.2.1 View from Below

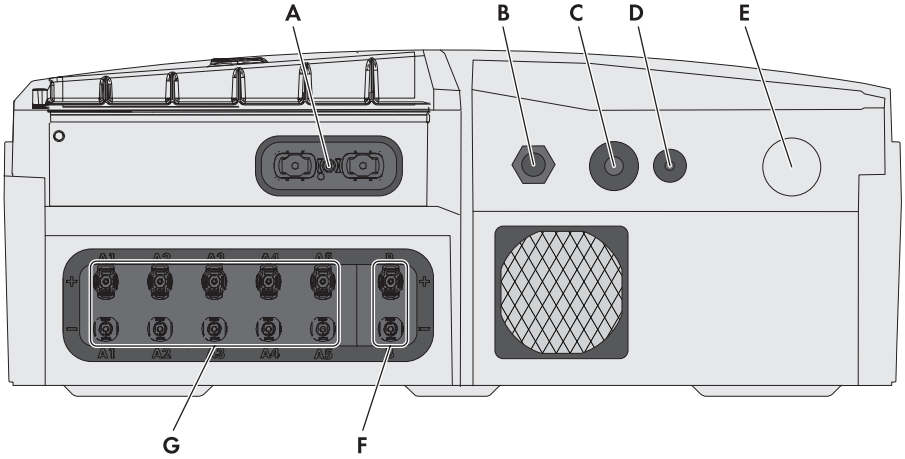


Figure 5: Connection areas and enclosure openings at the bottom of the inverter

Position	Designation
A	Pin connector for the ESS
B	Cable gland M20x1.5 for the connection cable of the multifunction relay
C	Enclosure opening with filler plug for the data cables and network cables
D	Enclosure opening with filler plug for the data cables and network cables
E	Enclosure opening for the AC cable
F	Positive and negative DC connectors, input B
G	Positive and negative DC connectors, input A

6.2.2 Interior View

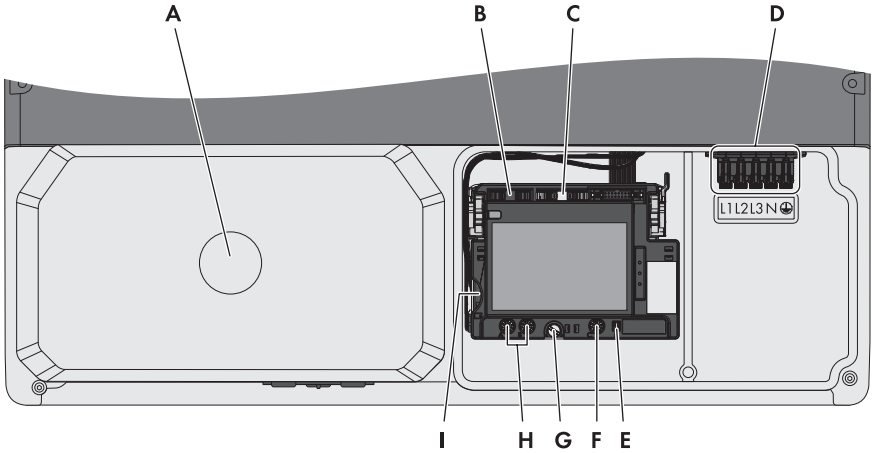


Figure 6: Connection areas in the interior of the inverter

Position	Designation
A	DC protective cover
B	Pin connector for connecting the multifunction relay
C	Pin connector for connecting the communication interface for RS485 or Speedwire/Webconnect
D	Connecting terminal plate for connecting the AC cable
E	Jumper slot for temporarily changing the display language to English (for service purposes)
F	Rotary switch C for configuring the NetID
G	Screw for releasing and raising the display
H	Rotary switch A and B for setting the country data set and the display language
I	Slot SD memory card

6.3 AC Connection

6.3.1 Requirements for the AC Connection

Cable requirements:

- ☐ External diameter: 14 mm to 25 mm
- ☐ Conductor cross-section: 1.5 mm² to 16 mm²
- ☐ Maximum conductor cross-section with bootlace ferrule: 10 mm²

- ☐ Insulation stripping length: 12 mm
- ☐ The cable must be dimensioned in accordance with the local and national directives for the dimensioning of cables. The requirements for the minimum wire size derive from these directives. Examples of factors influencing cable dimensioning are: nominal AC current, type of cable, routing method, cable bundling, ambient temperature and maximum desired line losses (for calculation of line losses, see the design software "Sunny Design" from software version 2.0 at www.SMA-Solar.com).

Load-break switch and cable protection:

NOTICE

Damage to the inverter due to the use of screw-type fuses as load-break switches

Screw-type fuses (e.g. DIAZED fuse or NEOZED fuse) are not load-break switches.

- Do not use screw-type fuses as load-break switches.
- Use a load-break switch or circuit breaker as a load disconnection unit (for information and design examples, see the Technical Information "Circuit Breaker" at www.SMA-Solar.com).

- ☐ In PV systems with multiple inverters, protect each inverter with a separate three-phase circuit breaker. Make sure to observe the maximum permissible fuse protection (see Section 11 "Technical Data", page 50). This will prevent residual voltage being present at the corresponding cable after disconnection.
- ☐ Loads installed between the inverter and the circuit breaker must be fused separately.

Residual-current monitoring unit:

- ☐ If an external residual-current device is required, install a residual-current device which trips at a residual current of 100 mA or higher (for details on selecting a residual-current device, see the Technical Information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com).

Overvoltage category:

The inverter can be used in grids of overvoltage category III or lower in accordance with IEC 60664-1. That means that the inverter can be permanently connected to the grid-connection point of a building. In case of installations with long outdoor cabling routes, additional measures to reduce overvoltage category IV to overvoltage category III are required (see the Technical Information "Overvoltage Protection" at www.SMA-Solar.com).

Additional grounding:

i Safety in accordance with IEC 62109

The inverter is not equipped with a grounding conductor monitoring device. In order to guarantee safety in accordance with IEC 62109, you must take one of the following measures:

- Connect a grounding conductor made of copper wire with a cross-section of at least 10 mm² to the connecting terminal plate for the AC cable.
- Connect additional grounding with the same cross-section as the connected grounding conductor to the connecting terminal plate for the AC cable (see Section 6.3.3 "Connecting Additional Grounding", page 28). This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails.

Connection of additional grounding

In some countries, additional grounding is generally required. In each case, observe the locally applicable regulations.

- If additional grounding is required, connect an additional grounding with the same cross-section as the connected grounding conductor to the connecting terminal plate for the AC cable (see Section 6.3.3, page 28). This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails.

6.3.2 Connecting the Inverter to the Utility Grid

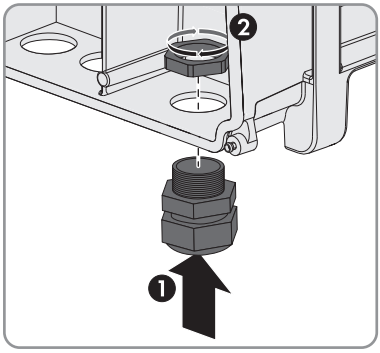
⚠ QUALIFIED PERSON

☐ The connection requirements of the grid operator must be met.

☐ The grid voltage must be in the permissible range. The exact operating range of the inverter is specified in the operating parameters.

Procedure:

1. Disconnect the circuit breaker from all three line conductors and secure against reconnection.
2. If the lower enclosure lid is mounted, loosen all screws of the lower enclosure lid using an Allen key (AF 3) and lift the enclosure lid from below and remove it.
3. Remove the adhesive tape from the enclosure opening for the AC cable.
4. Insert the cable gland from the outside into the enclosure opening and tighten it from the inside with the counter nut.



5. Route the AC cable into the inverter through the cable gland. If necessary, slightly loosen the swivel nut of the cable gland.
6. Remove the sheath from the AC cable.
7. Shorten L1, L2, L3 and N by 5 mm each.
8. Strip off the insulation of L1, L2, L3, N and PE by 12 mm.
9. Push the safety levers of the AC connecting terminal plate right up to the stop.

10. **⚠ CAUTION**

Risk of fire if two conductors are connected to one terminal

If you connect two conductors to a terminal, a fire can occur due to a bad electrical connection.

- Never connect more than one conductor per terminal.

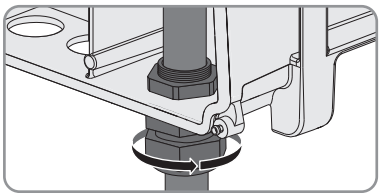
11. **⚠ CAUTION**

Danger of crushing when locking levers snap shut

The locking levers close by snapping down fast and hard.

- Press the locking levers of the connecting terminal plate for the AC cable down with your thumb only.
- Do not grip the entire connecting terminal plate for the AC cable.
- Do not place your fingers under the locking levers.

12. Connect PE, N, L1, L2 and L3 according to the labeling to the connecting terminal plate for the AC cable and push the safety levers down. The direction of the rotating magnetic field of L1, L2 and L3 is not relevant.
13. Make sure that all conductors are securely in place.
14. Tighten the swivel nut of the cable gland.



6.3.3 Connecting Additional Grounding

⚠ QUALIFIED PERSON

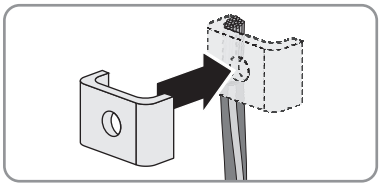
If additional grounding or equipotential bonding is required locally, you can connect additional grounding to the inverter. This prevents touch current if the grounding conductor at the connecting terminal plate for the AC cable fails. The required clamping bracket, the screw and the conical spring washer are part of the scope of delivery of the inverter.

Cable requirement:

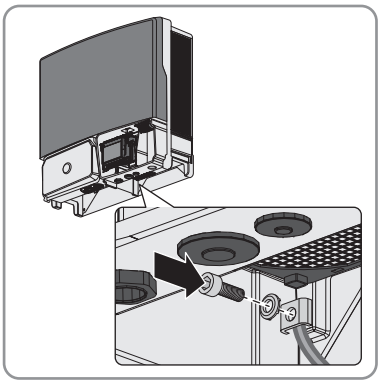
☐ Grounding cable cross-section: max. 16 mm²

Procedure:

1. Strip the grounding cable insulation.
2. Lead the clamping bracket over the grounding cable. Arrange the grounding cable on the left-hand side.



3. Screw the clamping bracket tight using the M6x16 cylindrical screw and the conical spring washer M6 (torque: 6 Nm). The teeth of the conical spring washer must face the clamping bracket.



6.4 DC Connection

6.4.1 Requirements for the DC Connection

Requirements for the PV modules per input:

- ☐ All PV modules must be of the same type.
- ☐ All PV modules must be aligned and tilted identically.
- ☐ On the coldest day based on statistical records, the open-circuit voltage of the PV array must never exceed the maximum input voltage of the inverter.
- ☐ The same number of series-connected PV modules must be connected to each string.
- ☐ The maximum input current per string must be maintained and must not exceed the through-fault current of the DC connectors (see Section 11 "Technical Data", page 50).
- ☐ The thresholds for the input voltage and the input current of the inverter must be adhered to (see Section 11 "Technical Data", page 50).
- ☐ The positive connection cables of the PV modules must be fitted with the positive DC connectors (for information on assembling DC connectors, see the DC connector installation manual).
- ☐ The negative connection cables of the PV modules must be fitted with the negative DC connectors (for information on assembling DC connectors, see the DC connector installation manual).

Use of Y adapters for parallel connection of strings

The Y adapters must not be used to interrupt the DC circuit.

- Do not use the Y adapters in the immediate vicinity of the inverter. The adapters must not be visible or freely accessible.
- In order to interrupt the DC circuit, always disconnect the inverter as described in this document (see Section 10, page 48).

6.4.2 Connecting the PV Array

⚠ QUALIFIED PERSON

⚠ WARNING

Risk of fire due to electric arc when thresholds on the DC input are exceeded

The electronic string fuse recognizes when the maximum short-circuit current is exceeded and short-circuits the PV array. This can cause an electric arc and thus a risk of fire.

- Ensure that the thresholds for the input voltage, the input current and the short-circuit current of the inverter are adhered to.

NOTICE

Damage to the DC connectors due the use of contact cleaner of other cleaning agents

Some contact cleaners or other cleaning agents may contain substances that decompose the plastic of the DC connectors.

- Do not use contact cleaners or other cleaning agents for cleaning the DC connectors.

Limitation of the electronic string fuse by using string connection boxes

When using string connection boxes, the functionality of the electronic string fuse may be limited.

Procedure:

1. Ensure that the circuit breaker is switched off from all three line conductors and that it cannot be reconnected.
2. Ensure that there is no ground fault in the PV array (see service manual at www.SMA-Solar.com).
3. Securely plug in the ESS. The ESS must be aligned parallel to and flush with the enclosure. If the ESS is plugged in when connecting the DC connectors, the protective function of the electronic string fuse can be activated.

4. **⚠ WARNING**

   Risk of fire due to reverse currents not being detected

   The electronic string fuse monitors the PV array and protects it against dangerous reverse currents which can cause a fire. In order to activate the electronic string fuse, you must observe the following during DC connection:

   - When connecting more than two strings, the first string must be connected to input B of the inverter. This activates the string fuse.
   - All strings must be clearly assigned to the correct DC input. Do not cross-wire or combine the strings.

5. Check whether the DC connectors have the correct polarity.

   If the DC connector is equipped with a DC cable of the wrong polarity, the DC connector must be assembled again. The DC cable must always have the same polarity as the DC connector.

6. If there are more than two strings, connect the first assembled DC connector to input B. This activates the string fuse.

   ☑ The green LED is flashing or glowing, no acoustic signal sounds and no error message is displayed. The string fuse is activated and all remaining DC connectors can be connected.

   ✖ The display does not show any data after a waiting period of at least 60 seconds and no acoustic signal sounds?

   The inverter is probably defective.

   - Ensure that the DC input voltage is at least 188 V.
   - Ensure that the DC connectors are not connected with reverse polarity.
   - If the DC input voltage is sufficient and the DC connectors are connected correctly, contact Service (see Section 13, page 56).

   ✖ An acoustic signal sounds and an error message with the event number 4001 appears in the display?

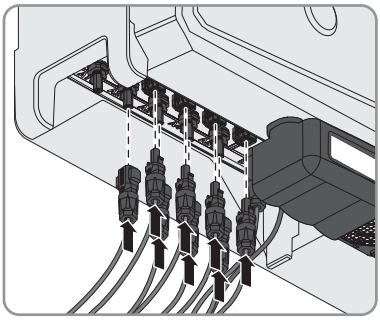
   The inverter short-circuits the PV array to avoid reverse currents through individual strings. The PV array and the inverter are in a safe state.

   - Do not remove the ESS and/or the DC connector under any circumstances. This prevents an electric arc from forming which can cause injuries and a fire.
   - Stop working on the inverter and wait until dark and until the acoustic signal no longer sounds.
   - If you would like to leave the PV system to continue work when it is dark, set up protection against contact (e.g. a fence) and protect the inverter against penetrating moisture (e.g. with tarp).
   - Only remove the ESS and all DC connectors and correct the connection once it is dark.

   ✖ An acoustic signal sounds and an error message with the event number 6313 or 8201 appears in the display?

   - Contact Service (see Section 13, page 56).

7. Connect the remaining assembled DC connectors to input A.



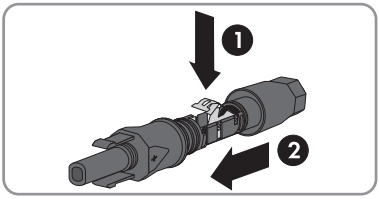
8. Ensure that all DC connectors are securely in place.

9. *NOTICE*

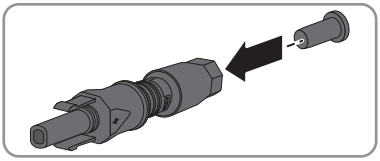
Damage to the inverter due to moisture ingress

The inverter is only properly sealed when all unused DC inputs are closed with DC connectors and sealing plugs.

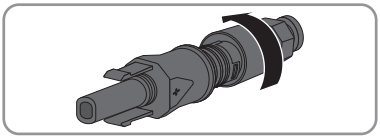
- Do not insert the sealing plugs directly into the DC inputs on the inverter.
- For unused DC connectors, push down the clamping bracket and push the swivel nut up to the thread.



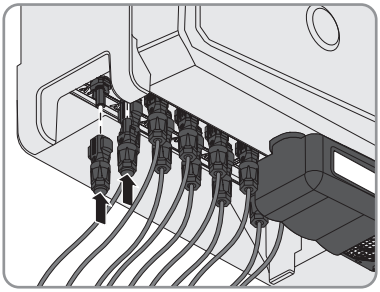
- Insert the sealing plug into the DC connector.



- Tighten the DC connector (torque: 2 Nm).



- Insert the DC connectors with sealing plugs into the corresponding DC inputs on the inverter.



☑ The DC connectors snap into place.

10. Remove the ESS.

☑ The display switches off.

7 Commissioning

7.1 Commissioning Procedure

⚠ QUALIFIED PERSON

Before you can commission the inverter, you must check various settings and make changes if necessary. This section describes the procedure and gives an overview of the steps, which must always be performed in the prescribed sequence.

Procedure		See
1.	Check which country data set the inverter is set to.	Supplementary sheet with the default settings, type label or display
2.	If the country data set is not set correctly for your country or your purpose, adjust to the required country data set and the corresponding display language within the first ten feed-in hours via the rotary switches in the inverter.	Section 7.2, page 34
3.	If the inverter is to communicate with several BLUETOOTH devices, or if BLUETOOTH is not to be used as a type of communication, set the NetID.	Section 7.3, page 35
4.	Commission the inverter.	Section 7.4, page 37

7.2 Configuring the Country Data Set

⚠ QUALIFIED PERSON

A display language is assigned to every country data set. Set the country data set appropriate for your country or purpose, with the corresponding display language, within the first ten feed-in hours via the rotary switches in the inverter. After the first ten feed-in hours, the country data set can only be changed by means of a communication product.

If the display language of the country data set does not match the required language, you can change it after commissioning (see Section 8.2 "Changing the Display Language", page 39).

i The country data set must be set correctly.

If you select a country data set which is not valid for your country and purpose, it can cause a disturbance in the PV system and lead to problems with the grid operator. When selecting the country data set, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).

- If you are not sure which country data set is valid for your country or purpose, contact your grid operator for information on which country data set is to be configured.

Country data set for operation with external decoupling protection

When operating the PV system with external decoupling protection, the inverter has the additional country data set **Medium-Voltage Directive (Germany)** or **MVtgDirective**. This country data set allows you to extend the operating range of the inverter for voltage and frequency. This country data set should only be selected if the PV system is disconnected via external decoupling.

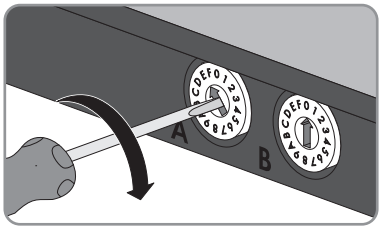
- If the country data set for operation is set with external decoupling protection, only operate the inverter with an external three-phase decoupling protection. Without external three-phase decoupling protection, the inverter will not disconnect from the utility grid when the country-specific standard requirement is exceeded.

Procedure:

1. Determine the rotary switch position for your country and purpose. Call up the Technical Information "Overview of the Rotary Switch Settings" at www.SMA-Solar.com.
2. **⚠ DANGER**

   Danger to life due to high voltages

   - Ensure that the inverter is disconnected from all voltage sources and that the enclosure lid is removed (see Section 10, page 48).
3. Set the rotary switches **A** and **B** to the required position using a flat-blade screwdriver (blade width: 2.5 mm).



☑ The inverter will adopt the setting after commissioning. This can take up to five minutes.

7.3 Setting the NetID

⚠ QUALIFIED PERSON

By default, the NetID is set to **1** for all SMA inverters and SMA communication products with BLUETOOTH. If your PV system consists of an inverter and a maximum of one further BLUETOOTH device (e.g. computer with BLUETOOTH interface or SMA communication product), you can leave the NetID set to **1**.

You must change the NetID in the following cases:

- If your PV system consists of one inverter and two other BLUETOOTH devices (e.g. computer with BLUETOOTH interface and SMA communication product) or of multiple inverters with BLUETOOTH, you must change the NetID of your PV system. This will enable communication with multiple BLUETOOTH devices.
- If another PV system with BLUETOOTH is located within 500 m of your PV system, you must change the NetID of your PV system. This will help keep both PV systems separate.
- If you do not wish to communicate via BLUETOOTH, deactivate the BLUETOOTH communication on your inverter. This will protect your PV system from unauthorized access.

All BLUETOOTH devices in a PV system must have the same NetID. You can set a new NetID in the inverter by means of the rotary switch **C**.

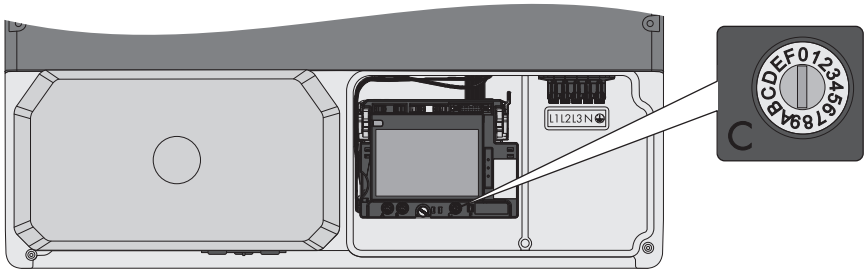


Figure 7: Positions of rotary switch C

Position	Explanation
0	Communication via BLUETOOTH is deactivated.
1	Communication via BLUETOOTH with a further BLUETOOTH device
2 to F	NetID for communication via BLUETOOTH with multiple BLUETOOTH devices

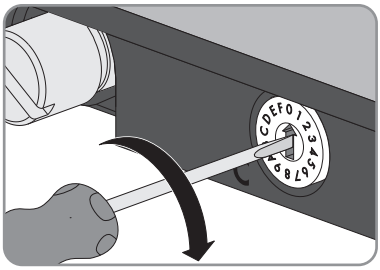
Procedure:

1. **⚠ DANGER**

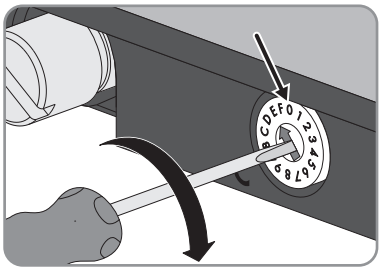
   Danger to life due to high voltages

   - Ensure that the inverter is disconnected from all voltage sources (see Section 10, page 48).

2. To set a new NetID, set the rotary switch **C** to the determined NetID using a flat-blade screwdriver (blade width: 2.5 mm).



3. To deactivate communication via BLUETOOTH, set the rotary switch **C** to position **0** using a flat-blade screwdriver (blade width: 2.5 mm). This will protect your PV system from unauthorized access.



☑ The inverter will adopt the setting after commissioning. This can take up to five minutes.

7.4 Commissioning the Inverter

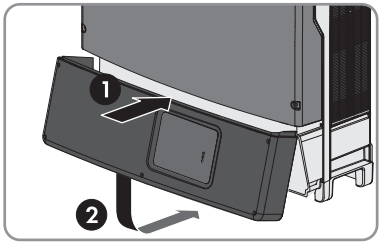
⚠ QUALIFIED PERSON

Requirements:

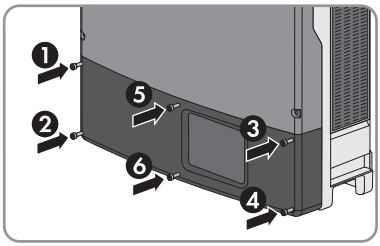
☐ The inverter must be correctly mounted.
☐ The circuit breaker must be correctly rated and mounted.
☐ All cables must be completely and correctly connected.
☐ Unused DC inputs must be sealed using the corresponding DC connectors and sealing plugs.
☐ The country data set must be set correctly for the country or the purpose.

Procedure:

1. Insert the lower enclosure lid from above and fold it down. The screws must protrude from the lower enclosure lid.



2. Tighten all six screws with an Allen key (AF 3) in the order 1 to 6 (torque: 2.0 Nm ± 0.3 Nm). By tightening the screws in the prescribed order, you avoid warping the enclosure lid, which would keep it from sealing correctly.
   Useful hint: If the screws fall out of the lower enclosure lid, insert the long screw into the lower middle hole and the five short screws into the other holes.



3. Securely plug in the ESS. The ESS must be aligned parallel to and flush with the enclosure.
4. Switch on the circuit breaker of all three line conductors.
5. If the multifunction relay is used, connect the supply voltage to the load.

☑ All three LEDs start to glow and the start-up phase begins. The start-up phase may take several minutes.

☑ The green LED is glowing and the display alternates automatically between the device type, firmware version, the serial number or designation of the inverter, the NetID, the configured country data set and the display language.

✖ The green LED is flashing?

Possible cause of error: the DC input voltage is still too low or the inverter is monitoring the utility grid.

- Once the DC input voltage is sufficiently high and the grid connection conditions are met, the inverter will start operation.

✖ The red LED is glowing and an error message and event number appear in the display?

- Rectify the error (see the service manual at www.SMA-Solar.com).

8 Configuration

8.1 Configuration Procedure

Once you have commissioned the inverter, you may have to adjust various settings via the rotary switches in the inverter or via a communication product. This section describes the procedure for configuration and gives an overview of the steps you must perform in the prescribed order.

Procedure		See
1.	If the display language is not set correctly, adjust the settings.	Section 8.2, page 39
2.	If the inverter is equipped with a Speedwire/Webconnect data module, integrate the inverter in a Speedwire network and register it in Sunny Portal, if necessary.	Manual of the communication product at www.SMA-Solar.com
3.	To manage the PV system data or to set the inverter parameters, capture the inverter in a communication product.	Manual of the communication product at www.SMA-Solar.com
4.	Change the system time and system password.	Manual of the communication product at www.SMA-Solar.com
5.	If you would like to use the self-learning string-failure detection, activate the string-failure detection.	Section 8.4, page 41
6.	Set the active power limitation in case of PV system control failure.	Section 8.5, page 41
7.	Reduce the attenuation of ripple control signals.	Section 8.6, page 42
8.	For partially shaded PV modules and depending on the given shading situation, you should set the interval at which the inverter optimizes the MPP of the PV system.	Section 8.7, page 42

8.2 Changing the Display Language

⚠ QUALIFIED PERSON

If the language for the country data set is not the language you want to use, you can change the display language as follows:

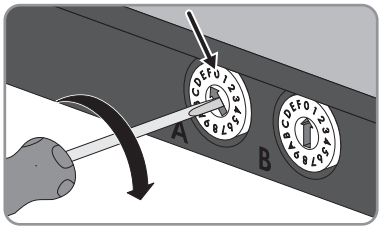
Procedure:

1. **⚠ DANGER**

   Danger to life due to high voltages

   - Disconnect the inverter from all voltage sources and open the enclosure lid (see Section 10, page 48).

2. Determine the rotary switch setting for the desired display language. Call up the Technical Information "Overview of the Rotary Switch Settings" at www.SMA-Solar.com.
3. Set the rotary switch **A** to **0** using a flat-blade screwdriver (blade width: 2.5 mm). This ensures that the selected data country set remains unchanged.



4. Set the rotary switch **B** to the required language using a flat-blade screwdriver (blade width: 2.5 mm).
5. Recommission the inverter (see service manual at www.SMA-Solar.com).

☑ The inverter adopts the settings after commissioning. This can take up to five minutes.

8.3 Changing Operating Parameters

⚠ QUALIFIED PERSON

This section describes the basic procedure for changing operating parameters. Always change operating parameters as described in this section. Some parameters that have sensitive functions can only be viewed and changed by qualified persons (for further information on changing parameters, refer to the manual of the communication product).

The operating parameters of the inverter are set to certain values by default. To optimize inverter operation, you can change the operating parameters using a communication product.

Requirements:

☐ Depending on the type of communication, a computer with a BLUETOOTH or Ethernet interface must be available.

☐ A communication product corresponding to the type of communication used must be available.

☐ The inverter must be registered in the communication product.

☐ The changes to the grid-relevant parameters must be approved by the responsible grid operator.

☐ When changing grid-relevant parameters, the SMA Grid Guard code must be available (see "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Call up the user interface of the communication product or software and log in as **Installer** or **User**.
2. If required, enter the SMA Grid Guard code.
3. Select and set the required parameter.
4. Save settings.

8.4 Activating String-Failure Detection

⚠ QUALIFIED PERSON

Identical alignment of the PV modules with activated string-failure detection

If you would like to activate the string-failure detection, the PV modules of input A and input B must be aligned identically and the input voltage must be at least 188 V. Thus, reversed polarity of the DC connection or a defective string will be recognized by the inverter.

- Ensure that all PV modules are aligned identically.
- Ensure that the input voltage is at least 188 V.

If identically aligned PV modules are connected to input A and input B of the inverter, you can activate the self-learning string-failure detection and/or the substring-failure detection.

The basic procedure for changing operating parameters is explained in another section (see Section 8.3 "Changing Operating Parameters", page 40).

Procedure:

- To activate string-failure detection, select the parameter **Operating mode of string failure detection** or **Op.PvProMod** and set to **Detect string failures** or **StrgFltDet**.
- To activate string-failure detection and substring-failure detection, select the parameter **Operating mode of string failure detection** or **Op.PvProMod** and set to **Detect partial string failures** or **PaStrgFltDet**.

8.5 Setting the Active Power Limitation in case of PV System Control Failure

⚠ QUALIFIED PERSON

You will need to set the active power limitation in case of PV system control failure if the active power limitation of the inverter is controlled by a communication product. By setting the active power limitation in case of PV system control failure, you ensure that the inverter will still feed the maximum permissible PV power into the utility grid, even if communication between inverter and communication product has failed.

The basic procedure for changing operating parameters is explained in another section (see Section 8.3 "Changing Operating Parameters", page 40).

Requirements:

☐ The parameter **Operating mode Active power** must be set to the value **Act. power lim. via PV system ctrl**.

☐ The firmware version of the inverter must be at least 2.62.04.R.

☐ The total installed PV power must be known.

☐ The active power feed-in specified by the grid operator must be known.

Default setting:

- STP 15000TL-10: 100%
- STP 17000TL-10: 100%

Procedure:

1. Ensure that the firmware version of the inverter is at least 2.62.04.R. If necessary, carry out a firmware update.
2. Select the parameter **Fallback act power lmt P in % of WMax for absent act power lmt** and set the required percentage.
3. Select the parameter **Operating mode for absent plant control** and set to **Use fallback setting**.

8.6 Reducing the Attenuation of Ripple Control Signals

⚠ QUALIFIED PERSON

By setting certain parameters, the attenuation of three-phase parallel ripple control frequencies ranging from 1,000 Hz to 1,100 Hz can be avoided. The parameters must only be set in consultation with the responsible grid operator.

The basic procedure for changing operating parameters is explained in another section (see Section 8.3 "Changing Operating Parameters", page 40).

Requirement:

☐ The firmware version of the inverter must be at least 2.62.04.R.

Procedure:

- Set the following parameters:

Parameter name for RS485	Parameter name for BLUETOOTH or Speedwire/Webconnect	Unit	Range	Value to be set
RplDet-NBS-Gain	Ripple control signal detection, amplification of narrow-band backup	V/A	0 to -10	-9
RplDet-NBS-Damp	Ripple control signal detection, attenuation of narrow-band backup	p.u.	-	0.1
RplDet-NBS-Hz	Ripple control signal detection, frequency of the narrow-band backup	Hz	1,000 to 1,100	Must be specified by the grid operator

8.7 Setting SMA OptiTrac Global Peak

⚠ QUALIFIED PERSON

For partially shaded PV modules, you should set the interval at which the inverter is to optimize the MPP of the PV system.

The basic procedure for changing operating parameters is explained in another section (see Section 8.3 "Changing Operating Parameters", page 40).

Procedure:

- Select the parameter **Cycle time of the OptiTrac Global Peak algorithm** or **MPPShdw.CycTms** and set the required time interval. The ideal time interval is usually six minutes. This value should only be increased if the shading situation changes extremely slowly.

☑ The inverter optimizes the MPP of the PV system at the predetermined time interval.

9 Operation

9.1 LED Signals

The LEDs indicate the operating state of the inverter.

LED	Status	Explanation
Green LED	glowing	Feed-in operation If an event occurs during feed-in operation, an event message will be shown on the display (for event messages see the service manual at www.SMA-Solar.com).
	flashing	The conditions for feed-in operation are not yet met. As soon as the conditions are met, the inverter will start feed-in operation.
Red LED	glowing	Error If an error occurs, the error message and the corresponding event number will be shown in the display. The error must be rectified by a qualified person (for troubleshooting, see the service manual at www.SMA-Solar.com).
Blue LED	glowing	BLUETOOTH communication is activated.

9.2 Display Overview

The display shows the current operating data of the inverter (e.g. current power, daily energy, total energy) as well as events or errors. Power and energy are displayed as bars in a diagram.

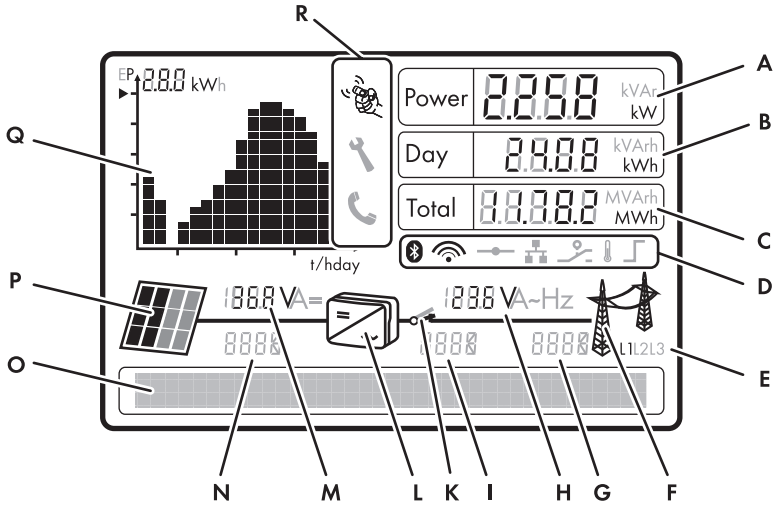


Figure 8: Layout of the display (example)

Position	Symbol	Explanation
A	-	Current power
B	-	Energy on the current day
C	-	Total amount of energy fed in

Position	Symbol	Explanation
D		Active BLUETOOTH connection
		Quality of the BLUETOOTH connection
		Active connection to a Speedwire network
		Active connection to Sunny Portal
		Multifunction relay is active
		Power limitation due to excessive temperature
		Active power limitation via PV system control
E	-	Line conductor to which the displayed values apply
F		Utility grid
G	-	Event number of an error on the utility grid side
H	-	Output voltage or output current of a line conductor
I	-	Event number of an error in the inverter
K		Grid relay When the grid relay is closed, the inverter feeds into the utility grid. When the grid relay is open, the inverter is disconnected from the utility grid.
L		Inverter
M	-	Input voltage or input current of a line conductor
N	-	Event number of an error on the PV array side
O	-	Text line to display event and error messages
P		PV Array

Position	Symbol	Explanation
Q	-	Diagram with the power curve of the last 16 feed-in hours or energy yields of the last 16 days • In order to switch between diagrams, tap once on the enclosure lid.
R		You can operate the display by tapping on the enclosure lid (see Section 9.3, page 47).
		The displayed error must be rectified on-site by a qualified person (for troubleshooting, see service manual at www.SMA-Solar.com).
		The displayed error cannot be rectified on-site. • Contact Service (see Section 13, page 56).

9.3 Activating and Operating the Display

You can activate and operate the display by tapping on the enclosure lid.

Procedure:

1. Activate the display. Tap on the enclosure lid once.
   ☑ The backlight is switched on.
2. To move to the next line, tap on the enclosure lid once.
3. In order to switch between the power curve of the last 16 feed-in hours and the energy yields of the last 16 days in the diagram, tap on the enclosure lid once.

9.4 Calling Up Display Messages of the Start-Up Phase

Various inverter information is displayed during the start-up phase that can be called up whenever required during operation.

Procedure:

• Tap on the enclosure lid twice.

☑ The display shows all messages of the start-up phase in sequence.

10 Disconnecting the Inverter from Voltage Sources

⚠ QUALIFIED PERSON

Prior to performing any work on the inverter, always disconnect it from all voltage sources as described in this section. Always adhere to the prescribed sequence.

NOTICE

Destruction of the measuring device due to overvoltage

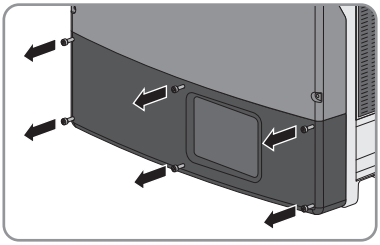
- Only use measuring devices with a DC input voltage range of 1,000 V or higher.

Procedure:

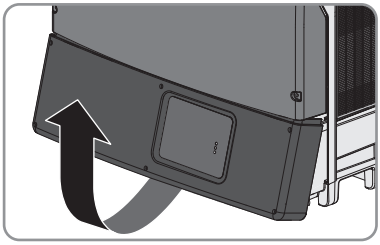
1. Disconnect the circuit breaker from all three line conductors and secure against reconnection.
2. If the multifunction relay is used, switch off any supply voltage to the load.
3. Test whether there is an acoustic signal.

   If an acoustic signals sounds and the display shows an error message that prohibits disconnecting the ESS, wait until dark. The ESS can only be disconnected once it is dark.

   If no acoustic signal sounds and the display does not show an error message, remove the ESS.
4. Wait until the LEDs and the display have gone out.
5. Remove all six screws from the lower enclosure lid using an Allen key (AF 3).



6. Flip the lower enclosure lid up and remove it.



7. ⚠ CAUTION

   Risk of burns when touching the DC protective cover

   The DC protective cover can get hot during operation.

   - Do not touch the DC protective cover.
8. Use an appropriate measuring device to ensure that no voltage is present at the AC connecting terminal plate between **L1** and **N**, **L2** and **N**, and **L3** and **N**. Insert the test probe into each round opening of the terminal.

9. Use an appropriate measuring device to ensure that no voltage is present at the AC connecting terminal plate between **L1** and **PE**, **L2** and **PE**, and **L3** and **PE**. Insert the test probe into each round opening of the terminal.
10. If you are using the multifunction relay, ensure that no voltage is present between any of the terminals on the multifunction relay and **PE** on the AC connecting terminal plate.
11. Use a current clamp to ensure that no current is present in the DC cables.
12. Release and remove all DC connectors. To do this, insert a flat-blade screwdriver or an angled screwdriver (blade width: 3.5 mm) into one of the side slots and pull the DC connectors straight out. Do not pull on the cable.
13. **⚠ DANGER**

    Danger to life due to high voltages in the inverter

    The capacitors in the inverter take 20 minutes to discharge.

    - Wait 20 minutes before opening the upper enclosure lid.
    - Do not open the DC protective cover.

14. ***NOTICE***

    Damage to the inverter due to electrostatic discharge

    Touching electronic components can cause damage to or destroy the inverter through electrostatic discharge.

    - Ground yourself before touching any component.

11 Technical Data

DC Input

	STP 15000TL-10	STP 17000TL-10
Maximum DC power at cos φ = 1	15,340 W	17,410 W
Maximum input voltage	1,000 V	1,000 V
MPP voltage range	360 V to 800 V	400 V to 800 V
Rated input voltage	600 V	600 V
Minimum input voltage	150 V	150 V
Initial input voltage	188 V	188 V
Maximum input current, input A	33 A	33 A
Maximum input current, input B	11 A	11 A
Maximum input current per string, input A*	40 A	40 A
Maximum input current per string, input B*	12.5 A	12.5 A
Maximum short-circuit current, input A**	50 A	50 A
Maximum short-circuit current, input B**	17 A	17 A
Maximum reverse current from the inverter in the system for max. 1 ms	0 A	0 A
Number of independent MPP inputs	2	2
Strings per MPP input, input A	5	5
Strings per MPP input, input B	1	1
Overvoltage category in accordance with IEC 60664-1	II	II

* To be observed in the event of a short circuit of the electronic string fuse.

** In accordance with IEC 62109-2: $I_{SC\,PV}$

AC Output

	STP 15000TL-10	STP 17000TL-10
Rated power at 230 V, 50 Hz	15,000 W	17,000 W
Maximum apparent AC power	15,000 VA	17,000 VA
Rated grid voltage	~3/N/PE, 230 V / 400 V	~3/N/PE, 230 V / 400 V
Nominal AC voltage	220 V, 230 V, 240 V	220 V, 230 V, 240 V
AC voltage range*	160 V to 280 V	160 V to 280 V
Nominal AC current at 230 V	21.7 A	24.6 A

	STP 15000TL-10	STP 17000TL-10
Maximum output current	24 A	24.6 A
Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power	≤3%	≤2.6%
Inrush current	< 20% of the nominal AC current for a maximum of 10 ms	< 20% of the nominal AC current for a maximum of 10 ms
Maximum output current under fault conditions	0.05 kA	0.05 kA
Rated power frequency	50 Hz	50 Hz
AC power frequency*	50 Hz / 60 Hz	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	44 Hz to 55 Hz	44 Hz to 55 Hz
Operating range at AC power frequency 60 Hz	54 Hz to 65 Hz	54 Hz to 65 Hz
Power factor at rated power	1	1
Displacement power factor cos φ, adjustable	0 leading to 0 lagging	0 leading to 0 lagging
Feed-in phases	3	3
Connection phases	3	3
Overvoltage category in accordance with IEC 60664-1	III	III

* depending on the configured country data set

Protective Devices

DC reverse polarity protection	Short-circuit diode, electronic string fuse
Protection against reverse currents	Electronic string fuse
Input-side disconnection point	Electronic Solar Switch, SUNCLIX DC connector
DC overvoltage protection	Thermally monitored varistors or surge arresters type II (optional)
AC short-circuit current capability	Current control
Grid monitoring	SMA Grid Guard 4
Maximum permissible fuse protection	50 A
Ground-fault monitoring for STP 15000TL-10	Insulation monitoring: R_{iso} > 366.3 kΩ

Ground-fault monitoring for STP 17000TL-10	Insulation monitoring: R_{iso} > 323.4 kΩ
All-pole sensitive residual-current monitoring unit	Available
Electronic string-current monitoring	Available
String-failure detection	Available

General Data

Width x height x depth, with Electronic Solar Switch	665 mm x 690 mm x 265 mm
Weight	59 kg
Length x width x height of the packaging	780 mm x 380 mm x 790 mm
Transport weight	65 kg
Climatic category in accordance with IEC 60721-3-3	4K4H
Environmental category	Outdoors
Pollution degree outside the inverter	3
Pollution degree inside the inverter	2
Operating temperature range	-25°C to +60°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above mean sea level (MSL)	3,000 m
Typical noise emission	51 dB(A)
Power loss in night mode	<1 W
Maximum data volume per inverter with Speedwire/Webconnect	550 MB/month
Additional data volume when using the Sunny Portal live interface	600 kB/hour
Topology	transformerless
Cooling method	SMA OptiCool
Degree of protection in accordance with IEC 60529	IP65
Protection class in accordance with IEC 61140	I

Grid configurations	TN-C, TN-S, TN-C-S, TT (when V_{N_PE} < 30 V)
Approvals and national standards, as per 10/2014*	AS 4777, BDEW 2008, C10/11:2012, CE, CEI 0-16, CEI 0-21, EN 50438, G59/3, IEC 60068-2, IEC 61727, MEA/PEA, IEC 62109-2, NEN 50438, PPC, PPDS, RD 1699, RD 661/2007, SI4777, UTE C15-712-1, VDE 0126-1-1, VDE AR-N 4105, VFR 2013, VFR 2014

* **C10/11:2012:** only possible if the three-phase line-to-line voltage is 400 V.
EN 50438: does not apply to all national appendices of EN 50438.
IEC 62109-2: This standard requires that either the multifunction relay in the inverter is used as fault indicator or that the inverter is connected to Sunny Portal and that the fault alert is activated in Sunny Portal.
NRS 97-2-1: This standard requires a separate label be attached to the AC distribution board to indicate the AC-side disconnection of the inverter in case of a grid failure (for further details, see NRS 97-2-1, Sect. 4.2.7.1 and 4.2.7.2).
MEA/PEA: only applicable to STP 17000TL-10

Climatic Conditions

Installation in accordance with IEC 60721-3-3, Class 4K4H

Extended temperature range	-25°C to +60°C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

Transport in accordance with IEC 60721-3-2, Class 2K3

Temperature range	-25°C to +70°C

Electronic Solar Switch

Electrical endurance in the event of short circuit, at nominal current of 33 A	At least 50 switching operations
Maximum switching current	33 A
Maximum switching voltage	1,000 V
Maximum power	20 kW
Degree of protection when plugged in	IP65
Degree of protection when unplugged	IP21

Features

DC Connection	SUNCLIX DC connector
AC connection	Spring-cage terminal
Display	LC graphic display

BLUETOOTH	As standard
RS485, galvanically isolated	Optional
Speedwire/Webconnect	Optional
Multifunction Relay	Optional
SMA Power Control Module	Optional

Torques

Upper enclosure lid screws	6 Nm ± 0.3 Nm
Lower enclosure lid screws	2 Nm ± 0.3 Nm
Screws for DC protective cover	3.5 Nm
Cylindrical screws M5x10 for securing the enclosure to the rear panel	3.5 Nm
Additional grounding	6.0 Nm
SUNCLIX swivel nut	2.0 Nm
RS485 communication or Speedwire/Webconnect connection	1.5 Nm
Multi-function relay connection	1.5 Nm

Data Storage Capacity

Energy yields in the course of the day	63 days
Daily yields	30 years
Event messages for users	250 events
Event messages for installers	250 events

Efficiency

Maximum efficiency, η_{max}	98.2%
European efficiency, η_{EU}	97.8%

12 Accessories

You will find the accessories for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

Designation	Brief description	SMA order number
RS485 data module	RS458 interface as retrofit kit	DM-485CB-10
Speedwire/Webconnect data module	Speedwire/Webconnect data module as retrofit kit	SWDM-10
SMA Power Control Module	Multifunction interface for implementing grid management systems for one inverter	PWCMOD-10
Multifunction relay	Multifunction relay as retrofit kit	MFR01-10
DC surge arrester	Type II surge arrester for input A and input B	DC_SPD_KIT_2-10

13 Contact

If you have technical problems with our products, please contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Inverter device type
- Inverter serial number
- Inverter firmware version
- Special country-specific settings of the inverter (if applicable)
- Type and quantity of PV modules connected
- Mounting location and altitude of the inverter
- Inverter message
- Optional equipment, e.g. communication products
- Operating mode of the multifunction relay (if present)

Australia	SMA Australia Pty Ltd. Sydney	Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200
Belgien/Belgique/België	SMA Benelux BVBA/SPRL Mecheln	+32 15 286 730
Brasil	Vide España (Espanha)	
Česko	SMA Central & Eastern Europe s.r.o. Praha	+420 235 010 417
Chile	Ver España	
Danmark	Se Deutschland (Tyskland)	
Deutschland	SMA Solar Technology AG Niestetal	Sunny Boy, Sunny Mini Central, Sunny Tripower: +49 561 9522-1499 Monitoring Systems (Kommunikationsprodukte): +49 561 9522-2499 Fuel Save Controller (PV-Diesel-Hybridsysteme): +49 561 9522-3199 Sunny Island, Sunny Backup, Hydro Boy: +49 561 9522-399 Sunny Central: +49 561 9522-299 Online Service: www.SMA.de/Service
España	SMA Ibérica Tecnología Solar, S.L.U. Barcelona	Llamada gratuita en España: 900 14 22 22 Internacional: +34 902 14 24 24

France	SMA France S.A.S. Lyon	Sunny Boy, Sunny Mini Central, Sunny Tripower: +33 472 09 04 40 Monitoring Systems: +33 472 09 04 41 Sunny Island : +33 472 09 04 42 Sunny Central : +33 472 09 04 43
India	SMA Solar India Pvt. Ltd. Mumbai	+91 22 61713888
Italia	SMA Italia S.r.l. Milano	+39 02 8934-7299
Κύπρος/Kıbrıs	Βλέπε Ελλάδα/ Bkz. Ελλάδα (Yunanistan)	
Luxemburg/ Luxembourg	Siehe Belgien Voir Belgique	
Magyarország	lásd Česko (Csehország)	
Nederland	zie Belgien (België)	
Österreich	Siehe Deutschland	
Perú	Ver España	
Polska	Patrz Česko (Czechy)	
Portugal	SMA Solar Technology Portugal, Unipessoal Lda Lisboa	Gratuito em Portugal: 800 20 89 87 Internacional: +351 212377860
România	Vezi Česko (Cehia)	
Schweiz	Siehe Deutschland	
Slovensko	pozri Česko (Česká republika)	
South Africa	SMA Solar Technology South Africa Pty Ltd. Centurion (Pretoria)	08600 SUNNY (08600 78669) International: +27 (12) 643 1785
United Kingdom	SMA Solar UK Ltd. Milton Keynes	+44 1908 304899
Ελλάδα	SMA Hellas AE Αθήνα	801 222 9 222 International: +30 212 222 9 222
България	Вижте Ελλάδα (Гърция)	
ไทย	SMA Solar (Thailand) Co., Ltd. กรุงเทพฯ	+66 2 670 6999
대한민국	SMA Technology Korea Co., Ltd. 서울	+82-2-520-2666

		+971 2 234-6177	SMA Middle East LLC أبو ظبي الإمارات العربية المتحدة
Other countries	International SMA Service Line Niestetal	Toll free worldwide: 00800 SMA SERVICE (+800 762 7378423)	

14 EC Declaration of Conformity

within the meaning of the EC directives

- 2004/108/EG (Electromagnetic compatibility, EMC)
- 2006/95/EG (Low voltage directive)
- 1999/5/EC (Radio and Telecommunications Terminal Equipment, R&TTE)

SMA Solar Technology AG confirms herewith that the inverters described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned directives. The entire EC Declaration of Conformity can be found at www.SMA-Solar.com.

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